

CLAIMS

1. A laser unit providing markings on a surface of a continuous strip (S) of metal, said laser unit comprising:
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beam generating means (100) for generating a beam (L) of laser radiation;

beam focusing means (154) for focusing the laser beam (L) onto said surface of said strip (S); and

10 beam deflecting means (152, 153) which effects a controlled deflection of the laser beam (L) in two mutually perpendicular directions (x, y), said beam deflection means (152, 153) being arranged intermediate the beam generating means (100) and the beam focusing
15 means (154);

wherein said laser unit (2) is operable to provide laser engraved markings at exact locations on said surface when said strip (S) intermittently is in an immobilized condition before being fed into a processing
20 apparatus (4), which mechanically shapes the thus-marked strip (S) into marked articles (T) to be included in cans.

2. A laser unit as set forth in claim 1, further comprising beam expansion means (151) which increases a
25 diameter of the laser beam (L) emitted from the beam generating means (100), said beam expansion means (151) being arranged intermediate the beam generating means (100) and the beam deflecting means (152, 153).

3. A laser unit as set forth in claim 1 or 2, which
30 is operable to provide about 1-5 μm deep engravings in said surface of said strip (S).

4. A laser unit as set forth in any one of claims 1-3, wherein the beam generating means (100) outputs laser radiation in the near IR wavelength range.

35 5. A laser unit as set forth in any one of claims 1-4, wherein the beam generating means (100) outputs laser radiation in a sequence of pulses.

6. A laser unit as set forth in any one of the preceding claims, further comprising a control unit (7) having a memory means (9) which receives and stores a pattern to be engraved on said surface, and a processor means (10) which operates said laser unit (2) to produce said pattern on said surface of said strip (S).

7. A laser unit as set forth in claims 5 and 6, wherein said processor means (10) is adapted to conjointly control said beam generating means (100) and said beam deflecting means (152, 153) such that one or more of said pulses form a visible pit in said surface, and such that a number of such pits are formed in said surface to reproduce said pattern.

8. A laser unit as set forth in claim 7, wherein said processor means (10) controls the time period between subsequent pulses such that each pulse has sufficient energy to generate such a visible pit.

9. A laser unit as set forth in claim 7 or 8, wherein said processor means (10) is adapted to, based on said pattern in said memory means (9), calculate the positions of all of said pits on said surface before operating said laser unit (2) to produce said pattern.

10. A laser unit as set forth in any one of claims 6-9, wherein said pattern comprises a number of characters.

11. A laser unit as set forth in claim 10, wherein said processor means (10) controls the beam deflecting means (152, 153) such that said characters are provided sequentially one after the other on said surface.

12. A laser unit as set forth in any one of the preceding claims, wherein the beam generating means (100) comprises a Nd:YAG laser.

13. A laser unit as set forth in any one of the preceding claims, wherein the beam generating means (100) comprises a diode laser pumped Nd:YAG laser.

14. A laser unit as set forth in any one of the preceding claims, wherein the beam generating means (100)

5 15. A laser unit as set forth in claim 14, wherein
said mode selection element (106) defines an aperture of
variable diameter which is arranged to selectively trans-
mit a portion of the laser beam (L).

17. A laser unit as set forth in any one of the preceding claims, which is arranged in the immediate vicinity of, but is physically unconnected to, said processing apparatus (4). B

19. A laser unit as set forth in any one of claims 1-17, wherein said marked articles are opening tabs (T) to be attached to ends for cans.

21. An arrangement for shaping and marking a continuous strip (S) of metal, comprising a processing apparatus (4) which mechanically shapes said strip (S) into articles (T) to be included in cans, a feeding means (6) which intermittently feeds said strip (S) through said processing apparatus (4), and a laser unit (2) according to any one of the preceding claims.

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